Equilibrium

PRINCIPLES OF ECONOMICS (ECON 210)

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Introduction

So far I have been careful to present the demand and supply curves in isolation from each other. Inquiry into quantity supplied and quantity demanded has treated them separately, and in each instance we’ve supposed that price is already known.

But price is determined by the combination of supply and demand, so now I must remove this pedagogical barrier between the two market forces.
How supply and demand combine to determine price

• Each hypothetical price level yields a unique combination of quantity supplied ($Q_S$) and quantity demanded ($Q_D$). But only 1 price yields an equality of $Q_S$ and $Q_D$. This is called the equilibrium price ($P^*$).

• The common level of $Q_S$ and $Q_D$ is the equilibrium quantity ($Q^*$).

$$\text{Equilibrium} \rightarrow Q_S = Q_D = Q^*$$

• This is shown graphically by the intersection of the supply and demand curves.
Equilibrium

\[ P^* = \$75/\text{unit} \]

\[ Q^* = 120 \text{ units} \]
Not equilibrium

• Any other price \( (P \neq P^*) \) results in either a surplus (not in the “Gains From Trade” sense) or a shortage.

\[
\begin{align*}
Q_S > Q_D & \rightarrow \text{Surplus} \\
Q_S < Q_D & \rightarrow \text{Shortage}
\end{align*}
\]

• Market output is limited by the smaller of the two.

• Consumers cannot be forced to buy more than they are willing to, despite conditions of surplus.

• And producers cannot be forced to produce more than they are willing to, even in a shortage scenario.
  • But some despots still try.
Surplus and shortage

\[ P > P^* \rightarrow \text{surplus} \]
\[ P < P^* \rightarrow \text{shortage} \]

• These disequilibrium conditions pressure price in the direction of equilibrium. Under shortage, unsatisfied consumers “bid up” the price closer to equilibrium. Under surplus, sellers “bid down” the price toward equilibrium.
Equilibrium: how much should be produced?

Instead of “what should the price be?” “how much should be produced?”

Answer: start at zero; continue increasing as long as the value to the marginal consumer meets or exceeds the cost of the marginal unit to the producer.

• “Marginal” means the next most valuable use and the next least costly unit to produce.

• So production should increase up to the point where the demand curve would dip below the supply curve.
How much should be produced? (continued)

• Equilibrium is the exhaustion of mutually beneficial trades.

• The converse of the thought experiment also holds: $Q > Q^*$ means all mutually beneficial trades have been made, along with some where cost exceeds willingness to pay. Somebody would have been better off without these transactions, so they are unlikely to be made voluntarily.

• So a happy outcome in equilibrium is that it maximizes gains from trade.
  • More about this in chapter 7.

$Q^* = 120$ units

Cost exceeds value
Comparative statics

• What happens when something changes? There are categories of things that shift either supply or demand.
  • See notes on chapter 3.

• When one curve shifts, the intersection also moves. This can take one of 4 possible forms.
  • See next slide.

• Equilibrium price and quantity both change in predictable ways. One must merely identify which curve shifts, in which direction it shifts, and locate the new equilibrium point to compare it to the old equilibrium.
Comparative statics (continued)

- Panels A & C show an increase in supply. The converse of this would be a decrease in supply.
  - Moving back from the red supply curve to the blue supply curve (in panel C) would be a decrease in supply.
- Panels B & D show an increase in demand. The converse is a decrease in demand.
  - Moving from the red demand curve (in panel B) to the blue demand curve would be a decrease in demand.
Comparative statics (concluded)

• These shifts are called “increases (decreases) in supply” (or demand).

• These terms refer to changes in the overall position of the curve as a consequence of something other than the good’s own price changing.

• Contrast this with “increase (decrease) in quantity supplied” (or demanded), which describes movement along a curve as a result of the good’s own price changing.
Conclusion

• As a generally applicable skill, Economics has nothing more useful to offer its students than supply/demand/equilibrium analysis.
  • When listening to news accounts, the ability to identify the effects of the event on buyers and sellers of various goods and predict how equilibria will change enriches the experience.
  • It can make the difference between a story seeming trivial and irrelevant to one’s own life and the same story having tangible consequences for one’s personal or professional plans.
  • This becomes more apparent the longer a student practices this skill and the more he recognizes that markets are linked, i.e., geographically, through time, and by relationships among goods.

• The next lecture is about measuring how sensitive $Q_S$ and $Q_D$ are to things like a good’s own price and the prices of related goods.
Aside

• Some people think they *can* force producers to produce as much as they want at a price they considers “fair” by threatening imprisonment.
  • Such as Venezuelan President Nicolás Maduro (links [here](#) and [here](#)).

• But this strategy is likely to make prices even higher—not lower. The threat of punishment for selling at equilibrium price is an added cost of producing in Venezuela that most other countries’ governments do not impose.

• What is likely to happen to the supply curve as producers respond to Mr. Maduro’s strategy?
  • More on this issue in chapter 8 in the textbook.

• Back.
Supply, demand, and equilibrium examples

The next few slides have questions that test students’ familiarity with the supply and demand model from chapters 3 and 4.
Cowen and Tabarrok question #3

Jon is on eBay, bidding for a first edition of the influential Frank Miller graphic novel *Batman: The Dark Knight Returns*.

• In this market, who is Jon competing with: the seller of the graphic novel or the other bidders?
He is competing with other bidders.
Cowen and Tabarrok question #4

Now Jon is in Japan, trying to get a job as a full-time translator; he wants to translate English TV shows into Japanese and vice versa. He notices that the wage for translators is very low.

• Who is the “competition” that is pushing the wage down?

• Does the competition come from businesses who hire the translators or from the other translators?
Question #4 answer

Jon is competing with other translators.
Suppose the market for batteries looks as follows. What is the equilibrium price and quantity?
Question #1 answer

Price: $4 per unit.
Quantity: 20 units.
Cowen and Tabarrok question #3 (thinking and problem solving section)

If the price of a one-bedroom apartment in Washington, DC, is currently $1,000 per month, but the supply and demand curves look as follows, then is there a shortage or surplus of apartments? What would we expect to happen to prices? Why?
There is a shortage of apartments. We would expect rents to rise as buyers who are willing to pay more than $1000 for an apartment begin to offer higher rents just to secure an apartment.

- They’d rather pay more than not get an apartment at all.
Cowen and Tabarrok question #8 (thinking and problem solving section)

If the price of margarine decreases, what happens to the demand for butter?
What happens to the equilibrium quantity and price for butter?
What would happen if butter and margarine were not substitutes?

Use a supply and demand diagram to support your answers.
Price and quantity of butter would decrease.

• If they were not substitutes, there would be no change in the demand for butter.
If a snowstorm was forecast for the next day, what would happen to the demand for snow shovels?

Is this a change in quantity demanded or a change in demand?

This shift in the demand curve would affect the price; would this cause a change in quantity supplied or a change in supply?
Demand for snow shovels would increase. This is a change in demand; people want a greater number of snow shovels at any price. The subsequent increase in price would cause a change in quantity supplied (a movement along the supply curve).
In 2002, the Atkins diet, which emphasized eating more meat and fewer grains, became very popular.

What do you suppose that did to the price and quantity of bread?

Use supply and demand analysis to support your answer.
Demand for bread decreases and thus equilibrium price and quantity decrease.
Cowen and Tabarrok challenges #1

For many years it was illegal to color margarine yellow (margarine is naturally white).
In some states, margarine manufacturers were even required to color margarine pink!

Who do you think supported these laws? Why?

Hint: Your analysis in question 8 from the previous section is relevant!
Challenge #1 answer

The dairy industry wanted to prevent margarine from being a good substitute for butter in order to keep butter prices high.

Yellow-colored margarine is a better substitute for butter than white or pink margarine!

Thus, the dairy industry lobbied for laws to prevent margarine manufacturers from making their product look more like butter.
- It is still illegal to sell colored margarine in Quebec.
Cowen and Tabarrok challenges #2

Think about two products,

- “safe cars” (a heavy car such as a BMW 530xi with infrared night vision, four-wheel antilock brakes, and electronic stability control), and
- “dangerous cars” (a lightweight car such as Ford’s old Festiva, pictured).

Part b

Part c
If oil executives read in the newspaper that massive new oil supplies have been discovered under the Pacific Ocean but will likely only be useful in 10 years, what is likely to happen to the supply of oil today?

What is the likely equilibrium impact on the price and quantity of oil today?
Challenge #4a answer

The supply of oil is likely to rise today. If oil is going to become cheaper in the future, then firms are more willing to pump it out of the ground and sell it today.

This will push today’s price down and push today’s quantity of oil up.
Cowen and Tabarrok challenges #4b

If oil executives read in the newspaper that new solar-power technologies have been discovered but will likely only become useful in 10 years, what is likely to happen to the supply of oil *today*?

What is the likely equilibrium impact on the price and quantity of oil *today*?
Challenge #4b answer

The same thing happens. Oil and solar power are substitutes in many cases (not in all cases!), so cheap solar energy in the future means that oil will be less desirable in the future. Time to pump the oil and sell it today while people are still willing to pay a lot for it!

To summarize,
If we learn today about promising future energy sources, today’s price of energy will fall and today’s quantity of energy will rise.
Sample exam question

If consumers view cappuccinos and lattés as substitutes, what would happen to the equilibrium price and quantity of lattés if the price of cappuccinos falls?

a. Both the equilibrium price and quantity would increase.
b. Both the equilibrium price and quantity would decrease.
c. The equilibrium price would increase, and the equilibrium quantity would decrease.
d. The equilibrium price would decrease, and the equilibrium quantity would increase.

ANS: B
Sample exam question

What would happen to the equilibrium price and quantity of lattés if coffee shops began using a machine that reduced the amount of labor necessary to produce them?

a. Both the equilibrium price and quantity would increase.
b. Both the equilibrium price and quantity would decrease.
c. The equilibrium price would increase, and the equilibrium quantity would decrease.
d. The equilibrium price would decrease, and the equilibrium quantity would increase.

ANS: D
Conclusion: a “formula” for answering these questions

1. Identify whether the change affects consumers or producers. If it affects producers, it shifts supply, and if it affects consumers, it shifts demand.

2. Which way does the curve shift? E.g., given that it affects consumers, does it make them more or less willing to buy the good? A change that makes them more willing shifts demand outward; less willingness shifts demand inward.

3. Draw the picture. Find the original equilibrium and draw the new supply or new demand curve according to your findings from steps 1 & 2.

4. Identify the new equilibrium and compare it to the old one, in terms of quantity and price.